

REVIEW

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Benefits of antioxidant supplements for knee osteoarthritis: rationale and reality

Ashok Kumar Grover^{*} and Sue E. Samson

Abstract

Arthritis causes disability due to pain and inflammation in joints. There are many forms of arthritis, one of which is osteoarthritis whose prevalence increases with age. It occurs in various joints including hip, knee and hand with knee osteoarthritis being more prevalent. There is no cure for it. The management strategies include exercise, glucosamine plus chondroitin sulfate and NSAIDs. In vitro and animal studies provide a rationale for the use of antioxidant supplements for its management. This review assesses the reality of the benefits of antioxidant supplements in the management of knee osteoarthritis. Several difficulties were encountered in examining this issue: poorly conducted studies, a lack of uniformity in disease definition and diagnosis, and muddling of conclusions from attempts to isolate the efficacious molecules. The antioxidant supplements with most evidence for benefit for pain relief and function in knee osteoarthritis were based on curcumin and avocado-soya bean unsaponifiables. Boswellia and some herbs used in Ayurvedic and Chinese medicine may also be useful. The benefits of cuisines with the appropriate antioxidants should be assessed because they may be more economical and easier to incorporate into the lifestyle.

Keywords: Arthritis, Turmeric, Curcumin, Piperine, Avocado, Boswellia, Superoxide, Peroxide, Peroxynitrite

Current knowledge

Arthritis may have originated before man itself since it also afflicts other primates [1]. The disease causes disability due to pain and inflammation in joints. There are many different types of arthritis of which rheumatoid arthritis and osteoarthritis (OA) are the most common. Rheumatoid arthritis is an autoimmune disease that affects mainly small joints such as those in the fingers of the hand. OA affects large joints such as hips and knees and also those in the hands. OA is a leading cause of disability with an unknown cause or cure. The global age standardised prevalence of OA in the knee and hip has recently been reported to be 3.8 and 0.85 %, respectively [2]. Worldwide estimates indicate that 9.6 % of men and 18 % of women >60 years have symptomatic OA (<http://www.who.int/chp/topics/rheumatic/en/>). Other risk factors of knee OA include trauma such as torn meniscus, occupation, exercise, gender (more common in females), ethnicity, genetics, obesity, diet and bone density [2]. Since OA normally progresses with

age, its economic burden may increase with the aging human population in the coming decades. This review will focus on knee OA which is more common. The knee joints are the largest and being synovial joints, they provide a very high degree of mobility. A knee joint provides two articulations - one between tibia and femur and the other between patella and femur [3, 4]. The joints allow for flexion, extension and a limited degree of rotation. It contains a bone-cartilage interface and a synovial body. The synovial body contains the fluid whose composition and viscosity are key to the knee operation. The bone-cartilage interface is a complex functional unit and biocomposite at the centre of joint function in which the individual components interact cooperatively and synergistically. Due to this intimate contact between bone and cartilage, any changes in either tissue will influence the other component. Its role in knee OA is discussed in the next section.

Pathophysiology of knee OA

The suggested causes for the development of OA include genetic predisposition, aging, obesity, trauma, and

^{*} Correspondence: groverashok@gmail.com
Department of Medicine, HSC, 4381 L. McVester University, 1280 Main Street,
W. Hamilton, ON L8S 4K1, Canada

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**Ann Butler Maher, Susan Warner
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Osteoarthritis, An Issue of Clinics in Geriatric Medicine, E-Book David Hunter, 2022-04-14 In this issue of Clinics in Geriatric Medicine guest editor Dr David Hunter brings his considerable expertise to the topic of Osteoarthritis Top experts in the field cover key topics such as obesity and nutrition influences in osteoarthritis the genesis of pain in osteoarthritis overview of disease management and more Contains 14 relevant practice oriented topics including overview of disease management concordance with guidelines and strategies to increase implementation of best evidence obesity and nutrition influences in osteoarthritis pathogenesis of osteoarthritis behavior change barriers and facilitators in people with osteoarthritis suitable candidates and realistic expectations in surgery for osteoarthritis and more Provides in depth clinical reviews on osteoarthritis offering actionable insights for clinical practice Presents the latest information on this timely focused topic under the leadership of experienced editors in the field Authors synthesize and distill the latest research and practice guidelines to create clinically significant topic based reviews *Biodiversity and Business* Laladhas Krishna Panicker, Prakash Nelliya, Oommen V. Oommen, 2024-12-04 This book addresses the climate risk influencing biodiversity globally and discusses the sustainable use of biological diversity and its legal implications The sustainable bio prospecting will help conservation regarding the resources and livelihood support of those who conserve it from the UN CBD perspective In mega bio diverse countries biodiversity provides a number of ecosystem services as well as sources of income livelihood for millions of poor and they are also the home of a vast repository of traditional knowledge TK associated with biological resources which can be translated therapeutically As for Climate risks the risks related to unscientific management and use of biodiversity are far more compared to the benefits for society and business and therefore reducing pressure on biodiversity and developing a sustainable commodity supply chain is essential for both the industry and the governments Exploring and further mining of the vastness of biodiversity potential in the marketplace has been a subject of great consideration among biotechnologists food processors health care specialists and the like as they are real money spinners The book will be of interest to researchers College University students interested in ecology and biodiversity conservation worldwide *Essentials of Exercise & Sport Nutrition: Science to Practice* Richard B. Kreider PhD FACSM FISSN FNAK, 2019-06-21 We all want to look and feel good We also want to perform well whether it is in the weight room in sports or at work Research has shown exercise proper nutrition and adequate recovery affect health and human performance However there is a lot of conflicting and confusing information regarding exercise and nutrition In *Essentials of Exercise and Sport Nutrition* author Dr Richard B Kreider offers an up to date assessment of the science and practice of exercise and sport nutrition Kreider who has conducted extensive research on the subject and has consulted with numerous teams coaches and athletes for more than thirty years brings a scientific and applied perspective to discussing the latest research and how it can be used to optimize performance He also provides summary recommendations training programs and meal plans for

beginners through athletes as well as for individuals who want to lose and or manage their weight **Nutrition in Clinical Practice** David Katz, Yeh Ming-Chin, Joshua Levitt, Kofi D. Essel, Shivam Joshi, Rachel Summer Clair Friedman, 2021-09-03
 Designed for busy clinicians struggling to fit the critical issue of nutrition into their routine patient encounters Nutrition in Clinical Practice translates the robust evidence base underlying nutrition in health and disease into actionable evidence based clinical guidance on a comprehensive array of nutrition topics Authoritative thoroughly referenced and fully updated the revised 4th edition covers the full scope of nutrition applications in clinical practice spanning health promotion risk factor modification prevention chronic disease management and weight control with a special emphasis on providing concisely summarized action steps within the clinical workflow Edited by Dr David L Katz a world renowned expert in nutrition preventive medicine and lifestyle medicine along with Drs Kofi D Essel Rachel S C Friedman Shivam Joshi Joshua Levitt and Ming Chin Yeh Nutrition in Clinical Practice is a must have resource for practicing clinicians who want to provide well informed compassionate and effective nutritional counseling to patients Nutrition in Clinical Practice David L. Katz, 2014-07-28 Written by one of America's foremost authorities in preventive medicine Nutrition in Clinical Practice is the practical comprehensive evidence based reference that all clinicians need to offer patients effective appropriate dietary counseling Each chapter concludes with concise guidelines for counseling and treatment based on consensus and the weight of evidence Appendices include clinically relevant formulas nutrient data tables patient specific meal planners and print and Web based resources for clinicians and patients Enhanced coverage of probiotics health effects of soy and other topics Information derived from a rigorous analysis of the published literature New chapter on food processing New chapter on functional foods New chapter on nutritional profiling systems Short chapters written for the busy clinician who needs actionable information Exercise Physiology John Porcari, Cedric Bryant, Fabio Comana, 2015-02-25 Learn how to apply the science of exercise physiology to your exercise programs and to solve the problems you'll encounter every day in practice You'll explore the principles of movement on which exercise is based while you develop the confidence you need to create individualized exercise programs based on current lifestyles schedules and abilities and properly progress those fitness programs through the stages of the ACE IFT training model **AARP The Inflammation Syndrome** Jack Challem, 2011-12-19 AARP Digital Editions offer you practical tips proven solutions and expert guidance In The Inflammation Syndrome Jack Challem provides a powerful plan to safely prevent and overcome inflammatory disorders Inflammation is what happens when our body's own defenses turn on us and it is a huge and growing problem Written by the author of the groundbreaking Syndrome X this essential updated edition of The Inflammation Syndrome draws on cutting edge research conducted around the world to provide a revolutionary approach to healing inflammation related problems through an easy to follow nutrition and supplement program Includes new recommendations for individualized diet and supplement plans Presents fourteen steps for restoring dietary balance plus recipes and menu plans Reveals the powerful role inflammation

plays in a wide variety of common health conditions from simple aches and pains to heart disease obesity diabetes arthritis asthma and athletic injuries Features dramatic case histories and the latest information on dosage recommendations for anti inflammation supplements such as fish oils vitamins and herbs Read *The Inflammation Syndrome* and learn just how easy it can be to take charge of your diet and health Orthopaedic Nursing Ann Butler Maher,Susan Warner Salmond,Teresa A. Pellino,2002 This comprehensive text provides the practicing nurse access to the physical sociocultural and physiological aspects of orthopedic nursing care and emphasizes up to date care for patients of all ages The text takes a team approach to care for patients in various transitional healthcare settings Pathophysiology and management modalities are covered in depth Introductory chapters offer the fundamentals necessary to provide care to orthopedic patients with various diagnoses The remainder of the book addresses orthopedic disorders categorized by physiologic processes New evidence based content and outpatient care strategies have been added throughout the text and Internet resources are included at the end of every chapter New chapters in the third edition explore genetics and wellness *Oxidative Eustress in Exercise Physiology* James N. Copley,Gareth W. Davison,2022-06-19 *Oxidative Eustress in Exercise Physiology* unravels key physiological responses and adaptations to different redox regulated exercise paradigms at the cell tissue and whole body level in model systems and humans in health and disease While the mechanistic details are still unclear key intracellular redox indices seem to be dysregulated with age Consequently beneficial molecular responses to acute endurance exercise decline in older individuals Recent research suggests that manipulating mitochondrial redox homeostasis by supplementing with the mitochondria targeted coenzyme Q10 for six weeks markedly improves physical function in older adults i e it may be possible to maximise the benefits of exercise by manipulating the redox environment The research described in this book suggests that significant translational potential exists with respect to cardiovascular disease neurodegeneration and cancer An international team of researchers documents the importance of redox biology in health and disease especially when exercise is a clinically useful tool for the treatment of many diseases and conditions Features Defines essential redox biology reactions and concepts in exercise physiology Assesses key redox parameters in an in vivo human exercise context Identifies the challenges opportunities and boundaries of current knowledge Includes a critique of the underlying mechanisms Summarises examples of translationally important research relating to disease states Related Titles Draper N H Marshall *Exercise Physiology for Health and Sports Performance* ISBN 978 0 2737 7872 1 Wackerhage H ed *Molecular Exercise Physiology An Introduction* ISBN 978 0 4156 0788 9 **EBOOK Clinical Sports Nutrition 5e** Louise Burke,Vicki Deakin,2015-09-18 *Clinical Sports Nutrition 5e* is a cornerstone of the Sports Medicine series offered by McGraw Hill This complete practical and clinical reference provides the latest sports nutrition information drawing on scientific research from around the globe All chapters have been substantially revised and updated with contributions from leading academics physicians and sports dietitians in Australia Canada the United States and the United Kingdom In addition there are seven new commentaries A molecular view

of exercise Female athlete triad and energy availability Measuring energy availability Treating low energy availability Vegetarian eating Antioxidant supplementation and exercise Fluid guidelines This respected reference work is an invaluable asset for students and instructors in the discipline of sports nutrition and is also essential reading for elite athletes sports professionals and trainers who need to keep their knowledge current **Veterinary Cancer Society Newsletter** Veterinary Cancer Society,2005 *The Complete Nutritional Supplements Buyer's Guide* Daniel Gastelu,2000 Nutrition expert Daniel Gastelu has written the ultimate guidebook for anyone who wants to know what they're putting in their bodies before they pop the cap on any of today's dietary supplements For the first time readers interested in improving their health can finally make sense of the booming and confusing world of vitamins minerals herbs metabolites and other supplements This extraordinary book gives an industry insider's view on what dietary supplements are how they are made and regulated why certain formulations are more effective than others and what scientific research tells us is safe and effective entry by entry The Complete Nutritional Supplements Buyer's Guide tells you how to choose the best products in the right doses for cardiovascular wellness weight loss sound sleep joint and bone health cholesterol reduction stress management memory skills and much more It lists the best supplements for beating fatigue headaches and depression for boosting energy levels and improving digestion And its comprehensive alphabetical guide analyzes every ingredient found in any supplement from acidophilus to zinc Everything you need to know about vitamins minerals herbal products amino acids botanicals and more The best formulas for health and longevity The top nutrients for stamina weight loss sleep joint health and memory The most effective supplements for fatigue headaches depression and women's health Ingredients you should avoid And much much more **Journal of the American Dietetic Association** ,2000 *The Washington Post Index* ,1989 **First Aid for the Internal Medicine Boards** Tao Le,Peter Chin-Hong,Tom Baudendistel,2008-03-23 A Complete Review of Every Internal Medicine Topic Included on the ABIM Exam by Residents for Residents Insider tips for outstanding performance from residents who've been there Complete coverage of every must know topic in one quick study resource Quick frequently tested high yield facts based on the most recently administered in service and board exams Board proven mnemonics and clinical pearls NEW 20 page full color insert of clinical images you must know at exam time 55 NEW images and 100 NEW pages of high yield facts Great for recertification Perfect for last minute review **Encyclopedia of Human Nutrition** Benjamin Caballero,Lindsay Allen,Andrew Prentice,2005-08-10 Encyclopedia of Human Nutrition Second Edition is a thorough revision and 20% expansion of the 1998 release reflecting the continuing scientific advances in the field of human nutrition Now a four volume set nearly 300 articles with concise up to date information are complemented by an award winning indexing system Included is expanded coverage of epidemiology of diet related diseases functional foods food safety clinical nutrition and gastrointestinal disorders Virtually everyone will find the Encyclopedia of Human Nutrition an easy to use resource making it an ideal reference choice for both the professional and the non professional alike Also available online

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